LEVEL III

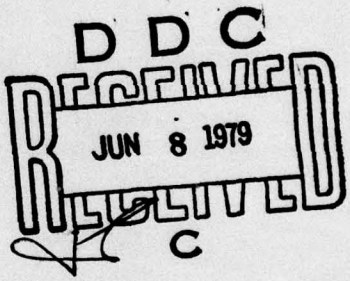
TRASANA

TECHNICAL REPORT NO. 3-78

AD A069579

FLIGHT PROFILE PERFORMANCE HANDBOOK

VOLUME VIII – CH-54B (TARHE)



APRIL 1979

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DEPARTMENT OF THE ARMY
US ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY
WHITE SANDS MISSILE RANGE
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(9) TECHNICAL REPORT NO. 3-78

(6) FLIGHT PROFILE PERFORMANCE HANDBOOK,

VOLUME VIII, CH-54B (TARHE),

DDC A-D-AD A069595 - A069578 - AD A063756

VOL. 9 - AD A063756

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(11) APRIL 1979

(14) TRASANA-TR-3-78-VOL-8

DEPARTMENT OF THE ARMY
US ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY
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409 764

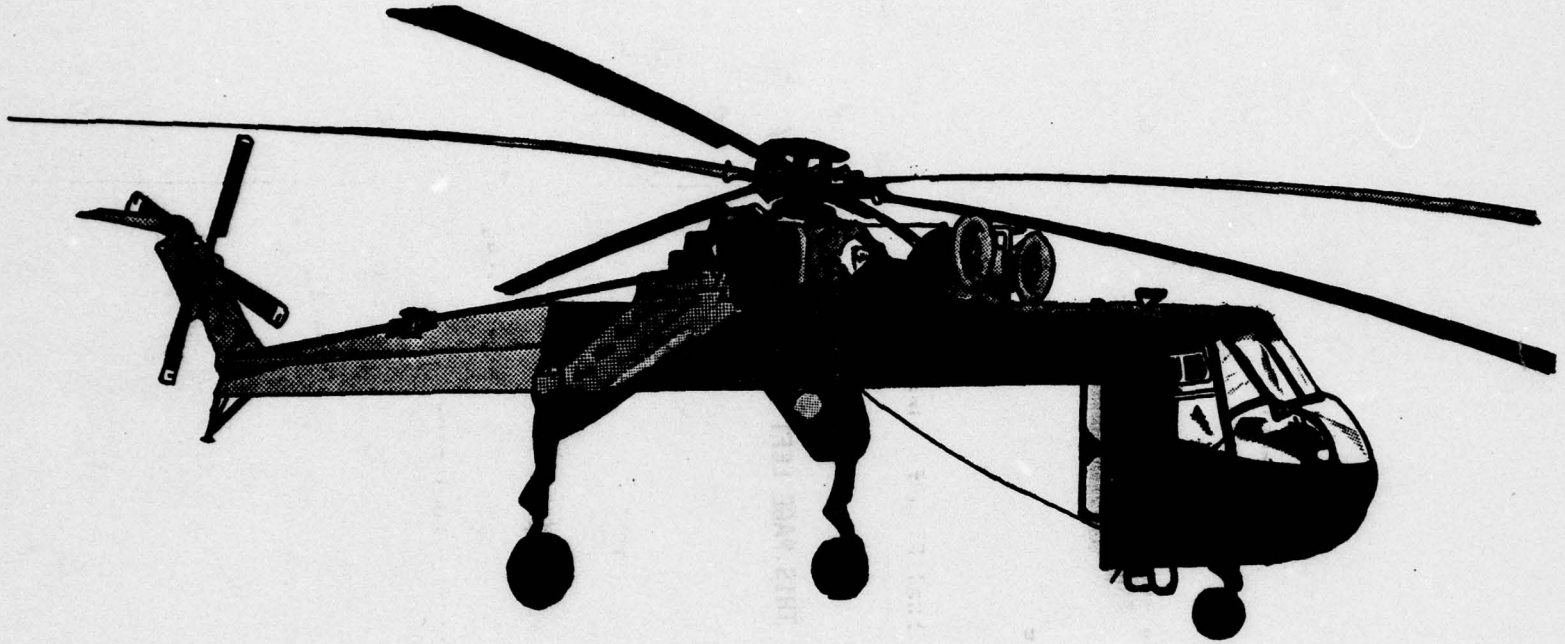
ACKNOWLEDGMENT

At AVRADCOM, Mr. Harold Sell, Mr. James O'Malley and Mr. Dale Pitt provided and validated the data in the Handbook. They also assisted in devising the formats to assure clarity in the data presentation and discussion.

At TRASANA, Mr. Frank Gonzalez provided help and guidance during the preparation of the Handbook.

TABLE OF CONTENTS

INDEX OF TABLES AND FIGURES



TARHE (CH-54)

CHAPTER 1

INTRODUCTION

1. PURPOSE

The purpose for preparing this handbook series is fourfold: (a) to validate TARHE performance data quickly, (b) to reduce the manpower and time to prepare accurate flight profiles, (c) to standardize performance data so that the analysis community can benefit from a single reference in conducting studies and (d) to provide a handbook that can be used for training in the mission profile planning area.

2. BACKGROUND

The TARHE performance data contained in this Flight Profile Performance Handbook (FPPH) series was originally acquired as a data base for the Aircraft Mission Processing Simulation (AMPS) model. AMPS is a computer program developed by the Aviation Systems Analysis Branch of the US Army TRADOC Systems Analysis Activity (TRASANA) to support Cost and Operational Effectiveness Analyses (COEAs). AMPS generates detailed flight profiles for a wide variety of helicopter missions. The data was provided TRASANA by the Army Aviation Research and Development Command (AVRADCOM) and was the most accurate data available to AVRADCOM at the time of handbook publication. In structuring the data base for AMPS it was noted that the data, when properly organized, could provide a method of doing quick and simple flight profile simulations. This volume presents the TARHE data and explains how it can be used.

3. OBJECTIVES OF THE HANDBOOK

a. Data Validation. This volume of the handbook contains tables with the precise performance data and format required to develop flight profiles for computer simulations. Using the handbooks as a reference, the individual project manager (PM) will be able to quickly validate or update as required all associated data contained in the different tables. If this procedure is followed by the various PMs, support of Helicopter COEAs and other analyses can be efficiently implemented.

b. Flight Profile Development. Much of the manpower and time spent in preparing flight profiles for supporting aircraft COEAs is dedicated to look-up, correlation and validation of performance data. Once the procedure contained in this handbook is implemented, flight profiles can be easily prepared. What normally took one man 4 to 5 days to prepare can now be prepared in 3 to 4 hours.

c. Standardization of Performance Data. Each of the PMs has been contacted by AVRADCOM to validate the performance data contained in each handbook in this series. Once each handbook is published, the data contained will be kept current as of the publication date. Since the requests for current information are constantly being forwarded to the PMs by analysis groups, this handbook can be a reference and assure a commonality in studies within the community.

d. Training for Planning Missions and Flight Profiles. For training purposes each handbook can stand alone. It is only a matter of following the example provided and applying the proper data to fit the flight profile desired. Although the example shown is simplistic, the methodology may be expanded to apply to any flight profile no matter how complex.

4. OTHER VOLUMES

This handbook is one of a series that covers the helicopters in the US Army inventory. The complete set of handbooks and their subjects are:

Volume I - FPPH Description

Volume II - UH-60A (BLACKHAWK)

Volume III - AH-1G (COBRA)

Volume IV - AH-1S (COBRA)

Volume V - YAH-64 (Advanced Attack Helicopter [AAH])

Volume VI - OH-58C (KIOWA)

Volume VII - CH-47 (CHINOOK)

Volume VIII - CH-54 (TARHE)

Volume IX - UH-1H (HUEY)

5. GENERAL HANDBOOK DESCRIPTION

a. Performance Data. The data contained in these volumes is TARHE performance data compiled from the results of actual experiments. It is not engineering data and is not intended to serve as a base for future helicopter construction or acquisition. The more mature the helicopter becomes, the less likely there will be a change in the basic performance data.

b. Handbook Organization. This volume is one of a series of volumes as identified in paragraph 4 above. Volume I is a description of the methodology used to develop the tables for each of the other volumes. This volume and all other volumes except Volume I provides a simplified flight profile example in Chapter 2. Chapter 3 provides an explanation of each of the five types of data tables contained in the handbook. The five types of tables deal with: (1) Basic Fuel Flow Data, (2) Delta Fuel Flow for Drag Data, (3) Ground Idle Fuel Flow Data, (4) Gross Weight Limits Data and, (5) Velocity Limits data. Chapter 4 contains the actual tables to be used for developing flight profiles.

CHAPTER 2

FLIGHT PROFILE EXAMPLE

1. GENERAL

This chapter provides an example of how to develop a flight profile, albeit simple, that can be extended to cover any number of stops, loads and distances all depending on helicopter capability and fuel available.

2. DISCUSSION

a. The main question this example of a flight profile will answer is, "Do I have enough fuel to fly the proposed mission?"

b. Suppose a pilot is to fly a simple resupply mission in a CH-54B TARHE helicopter that calls for flying (as shown in illustration 2-1) from point A (the air base), to point B (the pick up area) to point C (the drop off area) and return to A.

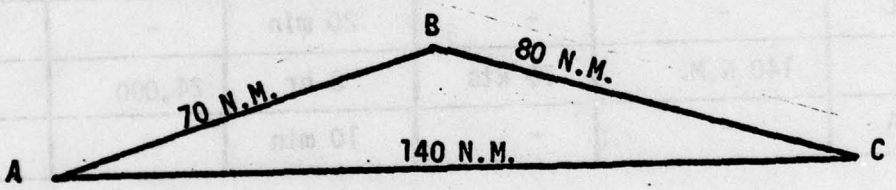


Illustration 2-1

c. The other information given is airspeed (AS) from A to B which is to be 70 knots (kts), from B to C 40 kts, and from C to A 70 kts. The TARHE helicopter is to be flown, at 4,000 ft for all legs at an ambient temperature of 15°C, and an idle altitude for take off, pick-up and drop off areas (ground level) of 2000 ft*. The mission plan also shows 10 minutes idle at A before take off, 20 minutes idle at B while loading, 20 minutes idle at C while unloading and 10 minutes idle on return to A before shut down. The TARHE will be flown empty at a gross weight (GW) of 28,000 lbs from A to B, the cargo from B to C will be 16,000 lbs, then from C to A at a weight of 24,000 lbs.

**All altitudes are in reference to sea level.*

d. The flight plan is prepared by drawing up a table similar to Table 2-1 below. By filling in the blanks under fuel, it can be determined if the total is too large for the helicopter.

TABLE 2-1

Helicopter: TARHE (CH-54B)

Altitude: 4000 ft flight/2000 ft idle

Temperature: 15°C

LEG	DISTANCE	AS	TIME	GW (lbs)	FUEL
Idle @ A	-	-	10 min	-	
A-B	70 N.M.	70 kts	1 hr	28,000	
Idle @ B	-	-	20 min	-	
B-C	80 N.M.	40 kts	2 hr	44,000	
Idle @ C	-	-	20 min	-	
C-A	140 N.M.	70 kts	2 hr	24,000	
Idle @ A	-	-	10 min	-	

e. First fill in Idle @ A, Idle @ B, Idle @ C and 2nd Idle @ A since they will all come from Table 2-2. In each case the idle is at 2000 ft and a temperature of 15°C. Consulting the ground idle fuel shown in Table 2-2, the value of 1640 lbs/hr is at the intersection of 2000 ft and 15°C.

1st Idle @ A = 1/6 X 1640 = 273 lbs

Idle @ B = 1/3 X 1640 = 547 lbs

Idle @ C = 1/3 X 1640 = 547 lbs

2nd Idle @ A = 1/6 X 1640 = 273 lbs

TABLE 2-2

GROUND IDLE FUEL FLOW

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	1652	1528	1420	1320	1224	1136
	-5 C	1710	1580	1466	1364	1266	1180
	15 C	1780	1640	1522	1418	1314	1216
	35 C	1832	1698	1576	1464	1350	1260

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

TABLE 2-3

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2775	2933	2694	2465	2435	2620	3050	3648	4578
28000	3029	3247	2955	2663	2572	2746	3137	3727	4680
32000	3321	3571	3234	2896	2733	2876	3243	3821	4834
36000	3643	3924	3544	3164	2928	3037	3366	3929	5041
40000	3996	4343	3895	3446	3155	3207	3511	4082	5377
44000	4430	4906	4334	3761	3401	3396	3686	4353	5974
47000	4829	5465	4751	4036	3594	3551	3843	4620	6605

Notice the conversion from minutes to hours. These values must be used because fuel flow is in lbs/hr.

f. The fuel flow for the three legs of the mission are calculated next. The heading on Table 2-1 shows a need for the Basic Fuel Flow data chart for TARHE helicopter flying at 4000 ft and at 15°C ambient temperature. Table 2-3 contains the necessary information.

(1) Leg A-B is at 70 kts and 28,000 lbs. This is not one of the values given but 60 kts is 2572 lb/hr and 80 kts is 2740 lb/hr. Interpolation gives the value of 2656 lb/hr for a 70 kts airspeed. Since the leg is one hour long:

Leg A-B = 1 X 2656 = 2656 lbs

(2) Leg B-C is at 40 kts and 44,000 lbs. This value is in the table; 3761 lbs/hr. Since the leg is two hours long:

Leg B-C = 2 X 3761 = 7522 lbs

(3) Leg C-A is at 70 kts and 24,000 lbs. This fuel flow rate is computed to be 2528 lbs/hr. Since the leg is two hours long:

Leg C-A = 2 X 2528 = 5056 lbs.

g. The flight profile can be finished by filling in Table 2-1 as shown in Table 2-4.

TABLE 2-4

Helicopter: TARHE (CH-54B)
Altitude: 4000 ft flight/2000 ft Idle
Temperature: 15°C

LEG	DISTANCE	AS	TIME	GW (lbs)	FUEL
Idle @ A	-	-	10 min	-	273 lbs
A-B	70 N.M.	70 kts	1 hr	28,000	2656 lbs
Idle @ B	-	-	20 min	-	547 lbs
B-C	80 N.M.	40 kts	2 hr	44,000	7522 lbs
Idle @ C	-	-	20 min	-	547 lbs
C-A	140 N.M.	70 kts	2 hr	24,000	5056 lbs
Idle @ A	-	-	10 min	-	273 lbs
				Total	16874 lbs

h. Although only two look-up tables were used for this example, each type of table has several conditions that are changed so that a wide band of performance parameters can be addressed. The discussion on each of the five types of tables is contained in Chapter 3. A succinct description of each of these five types of tables is:

(1) Basic Fuel Flow Data: Gives the rate the aircraft uses fuel dependent on the given flight conditions.

(2) Delta Fuel Flow for Drag Data: Gives the additional rate of fuel flow to be added to the basic rate for external drag.

(3) Ground Idle Fuel Flow Data: Gives the rate fuel is used when the aircraft is on the ground with its engine running.

(4) Gross Weight Limits Data: A check on whether or not the aircraft has enough lift to take off with a given weight.

(5) Velocity Limits Data: Gives the optimum (long range) speed and maximum rates of speed.

CHAPTER 3

PERFORMANCE DATA TABLE DESCRIPTIONS

1. GENERAL

This chapter describes each of the five basic type tables used for developing flight profiles. The variables within each type of table are described as well as how the specific data required can be extracted.

2. BASIC FUEL FLOW DATA

a. The basic rate of fuel flow* is determined by five variables:

(1) Type of aircraft

(2) Altitude (Air Pressure)**

(3) Temperature***

(4) Gross Weight****

(5) Flight Mode

b. In each table (see Table 3-1) within the basic type, the first three variables are held constant for the whole table, i.e., (a) Type of Aircraft, (b) Altitude (Air Pressure) above sea level, and (c) Temperature. These variables are stated at the top of each table.

c. There are seven rows of fixed gross weights: 24,000 lbs, 28,000 lbs, 32,000 lbs, 36,000 lbs, 40,000 lbs, 44,000 lbs and 47,000 lbs. The nine columns are fixed flight modes.

(1) The first column is Hover In Ground Effect (HIGE). HIGE is used for hovers at a height of 10 feet or less and a component of forward flight 10 kts or less.

(2) The second column is Hover Out of Ground Effect (HOGE). This is used for hovers at a height of more than 10 feet.

**The basic fuel flow data represents a clean drag configuration with all doors closed, no wing stores, and no external sling loads.*

***All altitudes or air pressures are feet above sea level.*

****For simplicity, all temperatures are considered to be the average temperature in which the helicopter is operating (Degrees Centigrade).*

*****Total vehicle weight in pounds.*

(3) The third column is Nap of the Earth (NOE). This is defined as all flight for variable speeds from 0 to 40 kts and variable altitudes.

(4) The remaining six columns are for given airspeeds* (in kts) as the flight mode.

d. There are 24 of these basic fuel flow charts. Each chart is for a different combination of Air Pressure (Altitude) and temperature.

e. The Basic Fuel Flow Data is the main table used in simulating a flight profile. For example, assume a pilot's flight path will require 30 minutes of flight at 80 kts airspeed, 4000 ft. altitude, 15°C and a gross weight of 28,000 lbs in a CH-54B helicopter. Using Table 3-1 at a gross weight of 28,000 lbs and an airspeed of 80 kts, the helicopter will use 2740 lbs/hr fuel, i.e., for 30 minutes, 1370 lbs of fuel will be used.

f. The gross weight values selected provide the basic range of load carrying capability for the nine flight modes of the TARHE helicopter. Within the gross weight band shown, linear interpolation** is quite accurate for estimating the fuel flow rates.

g. For example, using Table 3-1, if the helicopter's gross weight was 30,000 lbs and if the flight mode was 60 kts, the fuel flow cannot be found directly. But by interpolating between 60 kts, 28,000 lbs - 2572 lbs/hr and 32,000 lbs - 2733 lbs/hr, the basic fuel flow rate for 30,000 lbs is 2653 lbs/hr. In this example, if the helicopter flies in this mode for 30 minutes, 1327 lbs of fuel will be used.

h. As altitude and/or temperature changes occur, different tables are used to look up the aircraft's basic fuel flow rate for each leg of the flight path. Care must be taken that the proper table is used.

i. Appendix A contains a set of functions that will give a good approximation of the basic rate of fuel flow.

3. DELTA FUEL FLOW FOR DRAG DATA

a. The delta fuel flow for drag is also determined by five variables:

(1) Type of Aircraft

(2) Altitude (Air Pressure)

(3) Temperature

(4) Drag Surface (Equivalent Square Footage)

(5) Air Speed

All references to airspeeds are to true airspeeds.

***All references to interpolation are linear interpolations. See FPPH, Volume I, Chapter 3 for a discussion on the accuracy of interpolation.*

TABLE 3-1

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TANKL

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2775	2933	2694	2465	2435	2620	3050	3698	4578
28000	3029	3247	2955	2663	2572	2746	3137	3727	4680
32000	3321	3571	3234	2896	2733	2876	3243	3821	4832
36000	3643	3924	3544	3164	2928	3037	3366	3929	5041
40000	3996	4343	3895	3446	3155	3207	3511	4082	5377
44000	4430	4936	4334	3761	3401	3396	3686	4333	5972
47000	4829	5465	4751	4036	3594	3551	3843	4620	6605

TABLE 3-2

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	14	46	117	226	363	848
	100	28	93	239	438	762	1692
	150	42	141	361	645	1226	2931
	200	56	189	480	851	1788	3769

b. Like the basic fuel flow tables, there are 24 tables for delta fuel flow for drag.

c. There are four fixed rows of equivalent square feet of drag: 50 equivalent sq ft thru 200 equivalent sq ft.

d. The six columns are for airspeeds in kts of: 40 kts, 60 kts, 80 kts, 100 kts, 120 kts, and 140 kts.

e. When an external load is placed on the helicopter, the amount of fuel consumed per hour increases. The delta fuel flow for drag tables indicate how much extra fuel consumption to add to the basic fuel flow rate.

f. In the example given earlier, a 30 minute flight at 80 kts airspeed, 4000 ft altitude, 15°C and a gross weight of 28,000 lbs was used. Using the basic fuel flow tables, the basic fuel flow rate was 2740 lbs/hr. Assuming for this new example that part of the load is external and inducing a 100 equivalent sq ft external drag, the delta fuel flow for drag (Table 3-2) shows 239 lbs/hr should be added to the basic fuel flow rate. Thus the basic fuel flow rate becomes 2740 + 239 or 2979 lbs per hour and for a half-hour flight, 1490 lbs of fuel will be used instead of the 1370 lbs figured without an external load.

g. Appendix B contains a function that will give a good approximation of the delta fuel flow for drag.

4. GROUND IDLE FUEL FLOW DATA

a. The ground idle fuel flow rate is determined by only three variables:

(1) Type of Aircraft

(2) Altitude (Air Pressure)

(3) Temperature

b. There is only one ground idle fuel flow table (shown as Table 2-2). The table has four rows of temperatures: -25°C, -5°C, 15°C and 35°C, and six columns of altitudes: Sea Level, 2000 ft, 4000 ft., 6000 ft., 8000 ft., and 10000 ft.

c. The ground idle fuel flow table is used as discussed in the example flight profile in Chapter 2 (Table 2-2). The CH-54B helicopter idling for 20 minutes at 2000 ft. altitude and 15°C, (across the row labeled 15°C and down the column labeled 2000) find the intersection at 1640. Thus, the CH-54B uses 1640 lbs/hr at these conditions and since it is idling for 20 minutes or 1/3 of an hour, it will use 547 lbs of fuel.

d. If the helicopter had only been 1000 ft. above sea level, the consumption rate would be found by interpolating between the sea level rate of 1780 lbs/hr and the 2000 ft. rate of 1640 lbs/hr which would be 1710 lbs/hr. In 1/3 of an hour 570 lbs of fuel would be used.

e. Appendix C contains a function that will give a good approximation of the ground idle fuel flow.

5. GROSS WEIGHT LIMITS DATA

a. Gross weight limits tables are intended to show whether or not the aircraft can safely take off for four sets of criteria. These criteria are defined in the following paragraphs:

(1) Criteria #1 is based on the helicopter using 100% of Maximum Power for take off and having enough power to lift straight up and above ground effect (See Figure 3-1). Once it is in hovering above ground effect level the helicopter begins forward flight until it acquires, transitional lift and is able to climb at 450 ft/min (a desired standard rate of climb) to the desired altitude. This criteria has some risk since the pilot has no reserve power. It has less risk than Criteria #3 but more than Criteria #2 thus it is considered to be "Middle of the Road" risk.

(2) Criteria #2 (Figure 3-1) is based on the helicopter using 95% of Maximum Power for take off and enough power to immediately begin to climb at a rate of 450 ft/min. This is the least risky criteria since the pilot has power in reserve and is still able to climb at a satisfactory rate.

(3) Criteria #3 (Figure 3-1) has the most risk. Using 100% of Maximum Power the helicopter will only hover in ground effect. Therefore, at an altitude of 10 feet or less, the pilot must begin forward flight and gradually increase airspeed to acquire transitional lift to climb. The reasons for its high risk are readily apparent. First, there is no power in reserve. Second, the pilot must begin forward flight at a very low altitude.

(4) Criteria #4. Structural Gross Weight Limits is the total upper limit of gross weight the helicopter can carry under any take off criteria.

b. Gross Weight Limits are determined by four variables:

(1) Type of Aircraft

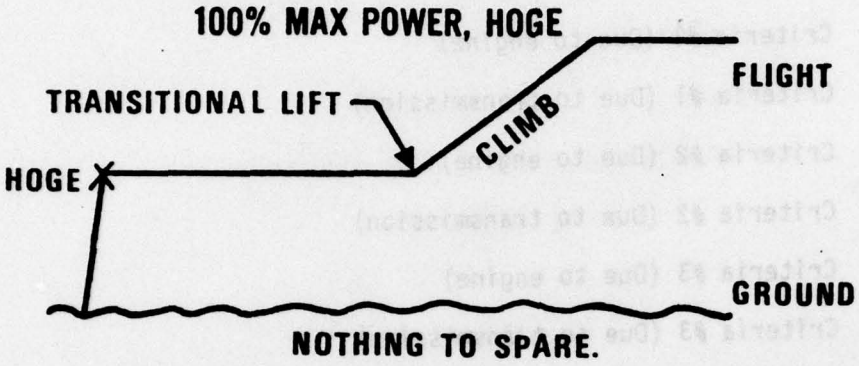
(2) Criteria Chosen

(3) Altitude (Air Pressure)

(4) Temperature

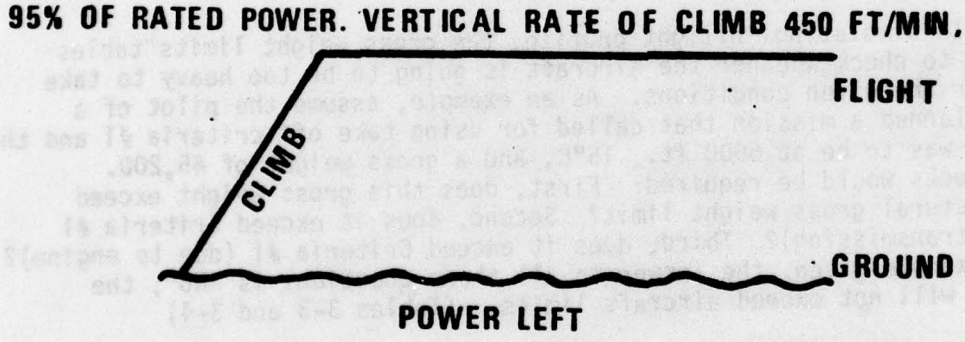
CRITERIA #1

(MIDDLE OF THE ROAD)



CRITERIA #2

(LEAST RISKY)



CRITERIA #3

(MOST RISKY)

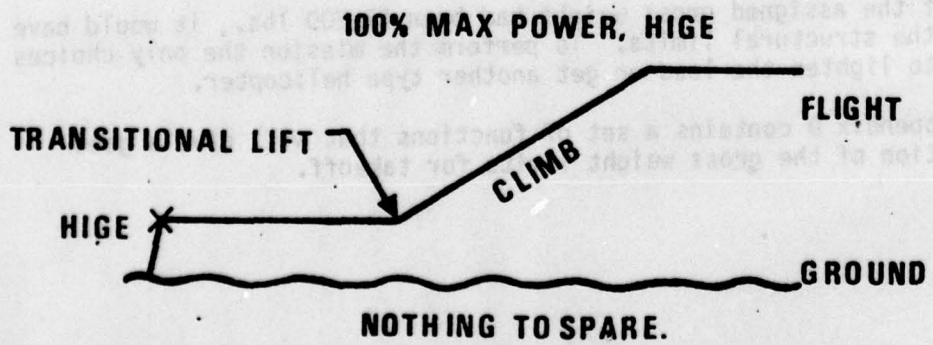


Figure 3-1

c. Additionally, Criteria #1, #2, and #3 differ due to engine power limits or transmission power limits of the aircraft. Thus there are six tables:

(1) Criteria #1 (Due to engine)

(2) Criteria #1 (Due to transmission)

(3) Criteria #2 (Due to engine)

(4) Criteria #2 (Due to transmission)

(5) Criteria #3 (Due to engine)

(6) Criteria #3 (Due to transmission)

d. The structural gross weight limit is a single value for each helicopter and is only dependent on the type helicopter. The CH-54B structural gross weight limit is given as 47,000 lbs and is listed at the bottom of each table. As the name implies, it is simply not safe to expect the CH-54B structure to maneuver normally when the total weight is larger than that value.

e. In simulating inflight profile, the gross weight limits tables are used to check whether the aircraft is going to be too heavy to take off under the given conditions. As an example, assume the pilot of a CH-54B planned a mission that called for using take off criteria #1 and the take off was to be at 6000 ft., 15°C, and a gross weight of 45,200. Three checks would be required: First, does this gross weight exceed the structural gross weight limit? Second, does it exceed Criteria #1 (due to transmission)? Third, does it exceed Criteria #1 (due to engine)? In the example given, the answer to all three questions is "No", the take off will not exceed aircraft limits. (Tables 3-3 and 3-4)

f. If the assigned gross weight had been 46,200 lbs, it would have exceeded the value given for 6,000 ft. and 15°C at Criteria #1 (Due to engine). (Table 3-3) The mission could not be flown as planned. The plan could be changed, for example to take off at 4000 ft. (which might not be practical) or change to take off Criteria #3 (which is more risky but has higher limits).

g. If the assigned gross weight had been 47,200 lbs., it would have exceeded the structural limits. To perform the mission the only choices would be to lighten the load or get another type helicopter.

h. Appendix D contains a set of functions that will give a good approximation of the gross weight limits for takeoff.

TABLE 3-3

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA AT

100% OF MAXIMUM POWER (HOGE)

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	64457	60128	56995	52155	48337	44737
	-5 C	61884	57722	53750	49955	46306	42873
	15 C	57141	53183	49342	45846	42403	39380
	35 C	52579	48758	45235	41974	38773	35701

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 3-4

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (HUGE)

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	53664	52442	50914	49482	47905	46433
	-5 C	52345	50842	49430	47874	46420	45045
	15 C	50800	49469	47935	46499	45134	43857
	35 C	49581	48074	46641	45287	44017	42823

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

6. VELOCITY LIMITS DATA

a. There are various types of data given in these tables but like the gross weight limits tables, they are primarily restraints on what can be expected of a helicopter in planning a mission profile. Velocity limits tables are influenced by five variables:

(1) Type of aircraft

(2) Air pressure (altitude)

(3) Temperature

(4) Gross weight

(5) Condition or limit

b. Items (1) through (4) are self-explanatory. There are five types of information that can be listed under (5):

(1) Long range

(2) Maximum continuous power

(3) Maximum power (due to engine limits)

(4) Transmission limits

(5) V_{ne} (velocity never exceed)

c. For each aircraft, there are 24 Velocity Limits Tables depending on air pressure and temperature combination. Table 3-5 is an example of the content of the Velocity Limits Table.

d. The two columns under Long Range (Table 3-5) give the optimum speed and fuel flow for each set of variables #1 through #4 above. Thus the CH-54B operating at 2000 ft., temperature 15°C, and having a gross weight of 28,000 lbs will fly a longer distance if the velocity is kept at 122 kts and will use 4056 lbs/hr of fuel at that velocity.

e. Maximum continuous power gives the fastest speed at which a helicopter can fly for long periods (30 minutes or more) and the associated fuel flow rate. An example from Table 3-5 would be a CH-54B at 2000 ft. and 15° weighing 28,000 lbs could fly 155 kts with a fuel usage of 6143 lbs/hr.

TABLE 3-5

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	121	3946	157	6143	163	6776	139	4829	104	3357
28000	122	4056	155	6143	162	6776	138	4829	104	3433
32000	123	4173	153	6143	160	6776	136	4829	104	3523
36000	123	4300	150	6143	157	6776	133	4829	104	3628
40000	123	4424	147	6143	153	6776	131	4829	104	3751
44000	122	4554	142	6143	148	6776	127	4829	97	3748
47000	120	4665	138	6143	143	6776	123	4829	83	3666

f. Maximum power (engine and transmission limits) show the maximum speeds the aircraft can structurally attain for short periods of time (less than 30 minutes). Thus the CH-54B helicopter at 2000 ft and 15°C weighing 28,000 lbs has an engine that is capable of producing enough power to fly 162 kts but the transmission limits the aircraft to 138 kts. Between these two columns then, the flight cannot exceed 138 kts with a fuel flow rate of 4829 lbs/hr.

g. There is another limiting factor called V_{ne} (velocity never exceed). This velocity limit is determined by helicopter structural considerations. V_{ne}'s are used in the same manner as maximum power limits described in paragraph f above. Since a value of 104 kts is listed for 2,000 ft., 15°C, and 28,000 lbs, this implies that none of the values in d, e, or f can be reached.

7. DETAILED FLIGHT PROFILE USING ALL PERFORMANCE DATA TABLES

The example of a Flight Profile in Chapter 2 was intentionally simplified to assure clarity. The description of the various tables in this handbook, however, indicates a more complex set of considerations are normally encountered in developing the flight profile. With the description provided in this chapter, additional information should be included in the flight plan beyond that shown in the example and a suggested format is provided below in Table 3-6.

TABLE 3-6

Helicopter:
Altitude:
Temperature:

LEG	DISTANCE	AS	CHECK VELOCITY LIMIT	TIME	GW (LBS)	DRAG	FUEL

Needed for each take off:
Weight at take off:
Type of take off:
Check transmission limits:
Check engine limits:
Check structural gross weight limit:

CHAPTER 4

TARHE (CH-54B) PERFORMANCE DATA TABLES

GENERAL

The following tables are the major information presented in this handbook. If the procedure for using them is understood, a flight profile for the TARHE (CH-54B) helicopter can be prepared in a matter of a few hours. The performance data contained have been reviewed for accuracy and are corrected to the best of our knowledge. The tables are organized in the following manner:

Tables 4-1 to 4-24	Basic Fuel Flow Data
Tables 4-25 to 4-48	Delta Fuel Flow for Drag Data
Table 4-49	Ground Idle Fuel Flow Data
Tables 4-50 to 4-55	Gross Weight Limits Data
Tables 4-56 to 4-79	Velocity Limits Data

BASIC FUEL FLOW DATA TABLES

TABLE 4-1

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2842	3061	2798	2535	2608	2897	3595	4374	6039
28000	3085	3319	3012	2704	2724	3017	3656	4442	6105
32000	3341	3549	3220	2891	2856	3135	3727	4517	6211
36000	3583	3822	3462	3102	3001	3267	3806	4608	6369
40000	3830	4126	3731	3337	3167	3404	3897	4714	6581
44000	4111	4450	4014	3578	3352	3546	4001	4836	6820
47000	4353	4736	4244	3760	3499	3655	4089	4939	7033

TABLE 4-2

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2918	3117	2865	2612	2656	2908	3521	4251	5540
28000	3158	3357	3071	2765	2775	3020	3590	4313	5601
32000	3408	3628	3302	2977	2907	3141	3666	4387	5701
36000	3668	3938	3567	3195	3057	3272	3767	4477	5850
40000	3949	4251	3846	3441	3230	3416	3859	4579	6048
44000	4263	4606	4152	3699	3430	3571	3975	4690	6308
47000	4512	4932	4414	3896	3591	3692	4075	4804	6570

TABLE 4-3

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2990	3176	2932	2686	2706	2930	3462	4163	5244
28000	3225	3411	3137	2864	2827	3040	3537	4248	5306
32000	3478	3725	3393	3061	2963	3160	3625	4307	5407
36000	3764	4051	3670	3288	3120	3292	3726	4399	5550
40000	4084	4361	3964	3547	3303	3442	3843	4501	5739
44000	4410	4779	4302	3826	3518	3610	3978	4629	6006
47000	4695	5110	4577	4043	3695	3746	4093	4762	6305

TABLE 4-4

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	3059	3219	2990	2761	2757	2958	3420	4094	5056
28000	3269	3481	3211	2942	2882	3068	3499	4166	5124
32000	3554	3824	3485	3146	3023	3186	3594	4252	5230
36000	3878	4160	3771	3382	3188	3323	3707	4349	5373
40000	4212	4535	4096	3657	3383	3480	3844	4461	5560
44000	4577	4940	4451	3962	3616	3661	4001	4620	5874
47000	4879	5319	4762	4205	3809	3810	4136	4794	6235

Table 4-5

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2743	2953	2689	2426	2472	2741	3367	4097	5638
28000	2994	3195	2899	2603	2597	2861	3433	4165	5723
32000	3242	3448	3126	2803	2735	2986	3506	4249	5857
36000	3485	3744	3384	3031	2893	3123	3595	4351	6050
40000	3753	4061	3666	3272	3073	3264	3695	4467	6301
44000	4072	4439	3977	3515	3268	3410	3811	4603	6563
47000	4336	4808	4256	3703	3419	3525	3913	4731	6866

TABLE 4-6

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2812	3007	2753	2500	2518	2750	3301	3977	5172
28000	3059	3248	2964	2681	2643	2866	3375	4045	5251
32000	3314	3546	3217	2887	2784	2993	3459	4128	5378
36000	3584	3859	3492	3124	2949	3132	3556	4226	5558
40000	3892	4192	3786	3381	3142	3284	3668	4337	5799
44000	4222	4620	4131	3643	3355	3446	3799	4477	6140
47000	4527	4994	4423	3852	3522	3572	3914	4628	6507

TABLE 4-7

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2878	3043	2807	2571	2565	2770	3249	3896	4896
28000	3119	3318	3038	2757	2693	2884	3330	3968	4976
32000	3391	3646	3309	2970	2840	3010	3425	4055	5103
36000	3701	3970	3594	3218	3013	3154	3537	4153	5274
40000	4023	4351	3922	3493	3220	3317	3666	4271	5513
44000	4395	4786	4286	3782	3454	3496	3810	4443	5899
47000	4723	5222	4620	4018	3638	3638	3951	4636	6300

TABLE 4-8

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2941	3092	2866	2641	2614	2795	3212	3835	4725
28000	3182	3402	3117	2832	2746	2910	3298	3914	4811
32000	3480	3746	3399	3053	2900	3038	3404	4007	4938
36000	3819	4099	3707	3314	3084	3186	3531	4111	5111
40000	4169	4495	4054	3612	3306	3360	3682	4253	5378
44000	4570	4987	4461	3935	3562	3558	3860	4478	5843
47000	4922	5445	4824	4202	3764	3720	4015	4727	6416

TABLE 4-9

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2653	2856	2592	2327	2347	2595	3154	3833	5268
28000	2907	3088	2801	2515	2478	2719	3225	3908	5376
32000	3149	3368	3049	2731	2628	2852	3306	4002	5543
36000	3404	3678	3324	2969	2801	2991	3401	4113	5774
40000	3711	4029	3621	3212	2992	3134	3513	4244	6029
44000	4062	4511	3987	3462	3193	3287	3647	4411	6413
47000	4403	4957	4314	3672	3351	3410	3767	4571	6780

TABLE 4-10

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2716	2888	2442	2397	2390	2603	3096	3721	4833
28000	2966	3161	2875	2589	2523	2723	3175	3796	4934
32000	3229	3472	3143	2813	2677	2858	3266	3888	5041
36000	3523	3790	3428	3066	2860	3005	3373	3995	5310
40000	3845	4194	3760	3325	3069	3164	3498	4125	5617
44000	4243	4689	4146	3604	3291	3333	3649	4320	6095
47000	4614	5210	4526	3843	3466	3470	3785	4543	6549

TABLE 4-11

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2775	2933	2699	2465	2435	2620	3050	3648	4578
28000	3029	3247	2955	2663	2572	2740	3137	3727	4680
32000	3321	3571	3234	2896	2733	2876	3243	3821	4834
36000	3643	3924	3544	3164	2928	3037	3366	3929	5041
40000	3996	4343	3895	3448	3155	3207	3511	4082	5377
44000	4430	4906	4334	3761	3401	3396	3686	4333	5972
47000	4829	5465	4751	4036	3594	3551	3843	4620	6605

TABLE 4-12

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2830	2992	2762	2531	2482	2644	3018	3594	4421
28000	3096	3334	3035	2737	2625	2764	3113	3680	4527
32000	3427	3672	3326	2980	2794	2903	3232	3779	4678
36000	3765	4059	3663	3267	3002	3068	3374	3903	4904
40000	4150	4514	4048	3582	3251	3260	3544	4102	5302
44000	4615	5121	4529	3936	3520	3475	3749	4425	6042
47000	5064	5738	4996	4255	3733	3654	3931	4784	6855

TABLE 4-13

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2572	2746	2492	2237	2233	2460	2956	3587	4928
28000	2820	3001	2720	2439	2372	2584	3032	3671	5065
32000	3065	3302	2986	2670	2535	2725	3121	3775	5270
36000	3352	3631	3272	2913	2722	2868	3226	3899	5514
40000	3689	4074	3619	3159	2920	3014	3364	4053	5866
44000	4134	4668	4052	3437	3131	3181	3514	4266	6346
47000	4575	5302	4495	3689	3303	3317	3657	4568	6845

TABLE 4-14

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOz	40	60	80	100	120	140
24000	2628	2790	2547	2304	2273	2466	2906	3483	4522
28000	2883	3069	2800	2511	2416	2593	2990	3567	4651
32000	3160	3402	3078	2754	2586	2735	3090	3667	4842
36000	3475	3769	3391	3012	2787	2891	3209	3786	5113
40000	3848	4235	3759	3283	3007	3057	3352	3960	5538
44000	4338	4911	4256	3600	3240	3238	3531	4252	6149
47000	4817	5595	4745	3895	3431	3392	3690	4602	6793

TABLE 4-15

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2680	2849	2609	2369	2316	2481	2866	3417	4286
28000	2953	3178	2881	2584	2464	2608	2963	3504	4413
32000	3269	3506	3172	2839	2644	2756	3077	3605	4575
36000	3601	3907	3513	3118	2862	2925	3214	3736	4877
40000	4010	4421	3921	3422	3104	3110	3381	3956	5391
44000	4540	5161	4473	3785	3361	3316	3586	4333	6223
47000	5089	5882	5008	4135	3573	3495	3780	4779	7063

TABLE 4-16

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2734	2920	2677	2434	2362	2503	2839	3370	4143
28000	3034	3263	2960	2657	2517	2632	2946	3463	4271
32000	3371	3629	3278	2926	2708	2784	3076	3572	4458
36000	3738	4045	3639	3233	2944	2964	3238	3740	4764
40000	4181	4606	4090	3574	3209	3178	3433	4026	5416
44000	4766	5417	4706	3994	3493	3416	3673	4502	6487
47000	5361	6138	5284	4429	3726	3622	3896	5062	7668

TABLE 4-17

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2495	2650	2404	2158	2128	2336	2771	3354	4620
28000	2737	2933	2654	2376	2279	2464	2854	3454	4791
32000	3001	3248	2932	2616	2457	2609	2952	3564	5036
36000	3324	3646	3253	2860	2652	2755	3071	3710	5335
40000	3735	4193	3661	3127	2859	2915	3221	3914	5773
44000	4318	5015	4238	3461	3089	3095	3414	4285	6424
47000	4905	5665	4724	3793	3287	3255	3601	4734	7103

TABLE 4-18

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2546	2712	2467	2222	2167	2334	2720	3202	4240
28000	2809	3023	2736	2446	2322	2474	2821	3355	4400
32000	3112	3353	3028	2703	2512	2625	2931	3465	4635
36000	3455	3789	3379	2968	2727	2787	3065	3615	4998
40000	3910	4460	3835	3269	2956	2964	3234	3871	5558
44000	4547	5279	4469	3660	3210	3168	3454	4329	6405
47000	5219	5992	5028	4064	3431	3352	3660	4901	7297

TABLE 4-19

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2599	2785	2536	2286	2209	2353	2697	3203	4042
28000	2894	3104	2815	2521	2372	2490	2802	3297	4176
32000	3217	3480	3137	2793	2574	2651	2929	3412	4406
36000	3598	3938	3512	3086	2810	2832	3085	3598	4827
40000	4094	4609	4020	3430	3063	3031	3281	3927	5583
44000	4811	5556	4724	3893	3345	3267	3535	4514	6691
47000	5500	6269	5343	4418	3592	3482	3785	5232	7945

TABLE 4-20

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2656	2860	2604	2349	2254	2374	2675	3163	3890
28000	2988	3202	2898	2595	2424	2515	2795	3262	4045
32000	3334	3596	3242	2869	2643	2686	2943	3399	4300
36000	3749	4104	3660	3216	2902	2887	3126	3641	4809
40000	4286	4843	4227	3611	3180	3116	3353	4060	5775
44000	5066	5794	4989	4185	3490	3384	3650	4794	7327
47000	5756	6506	5702	4897	3762	3633	3941	5639	9150

TABLE 4-21

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE -

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2418	2573	2332	2091	2034	2220	2601	3147	4344
28000	2665	2876	2400	2324	2260	2357	2691	3255	4554
32000	2967	3224	2895	2566	2390	2501	2801	3364	4811
36000	3337	3725	3273	2822	2592	2656	2940	3564	5215
40000	3871	4474	3805	3135	2815	2830	3121	3883	5813
44000	4648	5363	4469	3576	3078	3042	3369	4473	6703
47000	5287	6076	5072	4067	3322	3244	3622	5106	7600

TABLE 4-22

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2472	2649	2401	2153	2072	2224	2565	3059	3984
28000	2753	2963	2680	2398	2244	2367	2666	3161	4186
32000	3074	3356	3007	2658	2451	2525	2740	3284	4486
36000	3489	3687	3415	2943	2676	2697	2947	3504	4977
40000	4076	4716	4011	3307	2922	2892	3153	3903	5750
44000	4927	5664	4754	3843	3210	3137	3436	4654	6923
47000	5609	6376	5441	4506	3491	3373	3731	5403	8241

TABLE 4-23

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2532	2725	2470	2216	2113	2237	2541	3006	3785
28000	2848	3059	2766	2473	2296	2366	2658	3108	3973
32000	3197	3476	3116	2757	2521	2560	2801	3257	4298
36000	3652	4068	3574	3079	2769	2757	2983	3533	4956
40000	4299	4980	4243	3505	3042	2978	3221	4042	5958
44000	5203	5919	5061	4203	3369	3263	3552	4984	7615
47000	5885	6632	5857	5083	3670	3532	3896	5839	9524

TABLE 4-24

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)								
	HIGE	HOGE	NOE	40	60	80	100	120	140
24000	2601	2797	2536	2276	2159	2258	2526	2971	3664
28000	2938	3167	2859	2551	2353	2414	2661	3083	3858
32000	3321	3614	3239	2865	2598	2603	2829	3275	4242
36000	3808	4267	3749	3231	2870	2822	3041	3628	5067
40000	4528	5207	4476	3745	3170	3084	3318	4271	6426
44000	5440	6139	5412	4685	3532	3407	3705	5368	8817
47000	6123	6852	6283	5715	3865	3704	4091	6320	11182

DELTA FUEL FLOW FOR DRAG DATA TABLES

TABLE 4-25

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL $DRAG$

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	18	61	162	282	554	1407
	100	36	124	326	561	1239	2803
	150	54	186	485	852	2105	4200
	200	72	253	637	1167	2980	5596

TABLE 4-26

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	16	56	144	274	467	1219
	100	33	112	295	533	1003	2506
	150	50	171	447	791	1656	3798
	200	66	227	595	1059	2463	5091

TABLE 4-27

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	15	51	130	269	417	941
	100	31	103	266	519	867	2139
	150	46	156	407	760	1385	3342
	200	61	209	548	1000	2008	4544

TABLE 4-28

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	80	80	100	120	140
DRAG IN SQUARE FEET	50	14	47	119	258	386	762
	100	28	95	242	504	786	1757
	150	43	144	370	735	1221	2693
	200	57	193	502	959	1721	4017

TABLE 4-29

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	17	58	152	261	522	1308
	100	34	116	304	521	1170	2606
	150	52	178	449	794	1986	3904
	200	69	241	588	1090	2795	5203

TABLE 4-30

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	16	53	137	252	436	1149
	100	32	107	278	492	944	2341
	150	46	161	418	733	1562	3542
	200	64	217	554	984	2322	4744

TABLE 4-31

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - CH546

TARE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	15	48	124	247	389	691
	100	29	98	252	476	812	2010
	150	44	148	384	701	1302	3128
	200	59	198	514	925	1893	4246

TABLE 4-32

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2500 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	14	45	113	239	360	721
	100	27	90	229	464	732	1665
	150	41	136	350	678	1143	2720
	200	55	183	473	886	1616	3765

TABLE 4-33

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	17	56	142	241	493	1214
	100	33	112	281	484	1108	2420
	150	50	170	413	740	1878	3626
	200	67	224	539	1020	2624	4831

TABLE 4-34

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	15	50	130	231	411	1085
	100	30	102	261	454	890	2187
	150	46	154	389	678	1476	3303
	200	61	207	512	914	2194	4419

TABLE 4-35

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

DRAG IN SQUARE FEET	AIR SPEED IN KTS					
	40	60	80	100	120	140
50	14	46	117	226	363	848
100	28	93	239	438	762	1892
150	42	141	361	645	1226	2931
200	56	189	480	854	1788	3969

TABLE 4-36

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	13	43	107	220	334	685
	100	26	86	218	426	683	1585
	150	39	130	332	623	1071	2561
	200	52	174	446	816	1520	3532

TABLE 4-37

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	16	53	131	223	467	1124
	100	32	107	256	449	1053	2243
	150	46	163	376	690	1779	3362
	200	65	218	492	955	2465	4480

TABLE 4-38

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

DRAG IN SQUARE FEET	AIR SPEED IN KTS					
	40	60	80	100	120	140
50	15	48	122	212	387	1008
100	30	97	242	418	841	2143
150	44	147	359	626	1402	3079
200	59	196	470	850	2078	4114

TABLE 4-39

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	14	44	111	206	340	813
	100	27	89	225	401	717	1784
	150	41	134	337	593	1158	2748
	200	55	181	445	788	1694	3711

TABLE 4-40

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

DRAG IN SQUARE FEET	AIR SPEED IN KTS					
	40	60	80	100	120	140
50	13	41	102	201	311	656
100	25	82	207	389	634	1517
150	38	124	313	570	1006	2417
200	51	166	417	750	1433	3318

TABLE 4-41

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	16	51	119	206	444	1038
	100	31	102	232	418	1006	2074
	150	46	154	341	645	1664	3111
	200	61	205	447	896	2317	4148

TABLE 4-42

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	14	46	113	194	366	948
	100	28	93	222	385	799	1907
	150	42	141	327	582	1336	2867
	200	57	188	428	791	1947	3826

TABLE 4-43

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	13	42	105	187	319	784
	100	26	85	209	366	676	1685
	150	34	129	311	544	1097	2578
	200	53	173	408	726	1611	3471

TABLE 4-44

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	12	39	97	182	284	634
	100	24	79	195	354	598	1461
	150	37	119	293	520	947	2286
	200	49	160	387	687	1356	3121

TABLE 4-45

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	14	48	107	191	424	953
	100	28	95	208	390	963	1913
	150	41	142	308	605	1575	2873
	200	55	188	405	845	2179	3833

TABLE 4-46

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TANKE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	13	44	102	178	347	889
	100	26	88	200	356	762	1777
	150	38	132	295	540	1278	2665
	200	51	176	387	739	1844	3554

TABLE 4-47

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

		AIR SPEED IN KTS					
		40	60	80	100	120	140
DRAG IN SQUARE FEET	50	12	41	97	170	300	763
	100	24	82	192	335	640	1592
	150	36	123	282	500	1045	2419
	200	48	164	370	673	1538	3245

TABLE 4-48

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

DRAG IN SQUARE FEET	AIR SPEED IN KTS					
	40	60	80	100	120	140
50	11	38	91	164	270	623
100	23	76	181	320	564	1396
150	34	114	269	474	898	2169
200	45	153	363	630	1293	2942

GROUND IDLE FUEL FLOW DATA TABLE

TABLE 4-49

GROUND IDLE FUEL FLOW

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	1652	1528	1420	1320	1224	1136
	-5 C	1710	1586	1466	1364	1266	1180
	15 C	1788	1649	1522	1418	1314	1216
	35 C	1832	1698	1576	1464	1350	1260

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

GROSS WEIGHT LIMITS DATA TABLES

TABLE 4-50

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA AT

100% OF MAXIMUM POWER (HOGE)

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	64457	60128	55995	52155	48337	44737
	-5 C	61884	57722	53750	49955	46306	42873
	15 C	57141	53183	49342	45846	42483	39380
	35 C	52579	48758	45235	41974	38773	35761

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 4-51

GROSS WEIGHT LIMITS
(DUE TO TRANSMISSION)
FOR TAKEOFF CRITERIA #1
100% OF MAXIMUM POWER (HUGE)
AIRCRAFT - CH54B
TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	53864	52442	50914	49482	47905	46433
	-5 C	52345	50842	49430	47874	46420	45045
	15 C	50800	49469	47935	46499	45134	43857
	35 C	49581	48074	46641	45287	44017	42823

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 4-52

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #2

95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	60852	56765	52894	49280	45675	42270
	-5 C	58471	54530	50770	47180	43754	40491
	15 C	54005	50263	46635	43328	40150	37216
	35 C	49688	46072	42739	39659	36825	33791

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 4-53

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #2

TRANSMISSION POWER LIMIT. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	52017	50811	49436	48042	46604	45193
	-5 C	50729	49366	47996	46632	45160	43856
	15 C	49384	48030	46691	45254	43943	42700
	35 C	48131	46822	45401	44093	42856	41693

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 4-54

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #3

100% OF MAXIMUM POWER (HIGE)

AIRCRAFT - CH54B

TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	69346	64688	60240	56104	52000	48125
	-5 C	66504	62120	57744	53662	49742	46064
	15 C	61429	57171	53045	49283	45668	42331
	35 C	56556	52460	48661	45153	41714	38495

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

TABLE 4-55

GROSS WEIGHT LIMITS
(DUE TO TRANSMISSION)
FOR TAKEOFF CRITERIA AS
100% OF MAXIMUM POWER (HIGE)
AIRCRAFT - CH54B
TARHE

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	58286	56574	54979	53257	51536	49871
	-5 C	56470	54899	53197	51505	49869	48332
	15 C	54919	53242	51571	49949	48432	47002
	35 C	53375	51721	50114	48604	47181	45845

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 47,000 LBS

VELOCITY LIMITS DATA TABLES

TABLE 4-56

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - CH546

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	113	4053	157	8154	157	8161	127	4827	100	3593
28000	116	4250	157	8154	157	8161	126	4827	100	3656
32000	116	4317	156	8154	157	8161	125	4827	100	3727
36000	115	4387	155	8154	155	8161	124	4827	100	3806
40000	115	4471	153	8154	153	8161	122	4827	100	3897
44000	115	4565	151	8154	151	8161	120	4827	100	4001
47000	114	4647	149	8154	149	8161	118	4827	94	3943

TABLE 4-57

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - CH548

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	119	4229	161	7780	163	7986	131	4878	100	3521
28000	120	4321	161	7780	163	7986	130	4878	100	3590
32000	120	4406	160	7780	162	7986	129	4878	100	3668
36000	120	4499	158	7780	160	7986	127	4878	100	3757
40000	120	4602	156	7780	158	7986	125	4878	100	3859
44000	120	4720	153	7780	155	7986	123	4878	100	3975
47000	120	4818	150	7780	152	7986	121	4878	94	3945

TABLE 4-58

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	121	4198	156	6556	163	7251	135	4932	100	3462
28000	122	4303	156	6556	162	7251	134	4932	100	3537
32000	122	4417	154	6556	161	7251	133	4932	100	3625
36000	123	4538	152	6556	158	7251	131	4932	100	3726
40000	123	4667	149	6556	155	7251	128	4932	100	3843
44000	123	4789	145	6556	151	7251	125	4932	100	3976
47000	122	4893	142	6556	148	7251	123	4932	94	3972

TABLE 4-59

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SLA LEVEL TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	121	4145	150	5666	161	6473	139	4088	103	3519
28000	123	4263	149	5666	160	6473	138	4088	103	3596
32000	124	4441	147	5666	158	6473	136	4088	103	3688
36000	125	4587	144	5666	155	6473	134	4088	103	3798
40000	125	4682	141	5666	151	6473	131	4088	103	3926
44000	124	4811	137	5666	147	6473	127	4088	97	3946
47000	123	4959	134	5666	142	6473	124	4088	84	3851

TABLE 4-60

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	117	3958	158	7645	158	7654	131	4754	100	3367
28000	116	3984	158	7645	158	7654	130	4754	100	3433
32000	115	4052	156	7645	156	7654	128	4754	100	3508
36000	115	4128	155	7645	155	7654	127	4754	100	3595
40000	115	4221	152	7645	152	7654	125	4754	100	3695
44000	114	4329	149	7645	149	7654	122	4754	100	3811
47000	114	4417	146	7645	146	7654	120	4754	94	3778

TABLE 4-61

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	120	3977	161	7218	164	7486	135	4769	100	3303
28000	120	4059	160	7218	163	7486	134	4769	100	3376
32000	120	4148	159	7218	162	7486	132	4769	100	3460
36000	120	4247	157	7218	159	7486	130	4769	100	3557
40000	120	4360	153	7218	156	7486	128	4769	100	3669
44000	120	4490	150	7218	152	7486	125	4769	100	3800
47000	118	4539	146	7218	148	7486	123	4769	94	3790

TABLE 4-62

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	121	3946	157	6143	163	6776	139	4829	104	3357
28000	122	4056	155	6143	162	6776	138	4829	104	3433
32000	123	4173	153	6143	160	6776	136	4829	104	3523
36000	123	4300	150	6143	157	6776	133	4829	104	3628
40000	123	4424	147	6143	153	6776	131	4829	104	3751
44000	122	4554	142	6143	148	6776	127	4829	97	3748
47000	120	4665	138	6143	143	6776	123	4829	83	3666

TABLE 4-63

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	122	3909	150	5270	161	6007	143	4873	107	3411
28000	124	4058	148	5270	159	6007	141	4873	107	3494
32000	125	4223	146	5270	156	6007	139	4873	107	3592
36000	125	4323	142	5270	153	6007	136	4873	107	3706
40000	124	4438	139	5270	148	6007	133	4873	105	3784
44000	123	4629	133	5270	142	6007	128	4873	86	3619
47000	120	4745	129	5270	136	6007	123	4873	72	3696

TABLE 4-64

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	116	3667	158	7106	158	7163	134	4718	100	3154
28000	116	3733	157	7106	158	7163	133	4718	100	3225
32000	115	3805	155	7106	156	7163	131	4718	100	3306
36000	115	3893	153	7106	154	7163	129	4718	100	3401
40000	114	3996	150	7106	151	7163	127	4718	100	3513
44000	114	4114	146	7106	146	7163	124	4718	100	3647
47000	113	4227	142	7106	143	7163	122	4718	94	3638

TABLE 4-65

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	120	3728	161	6695	164	7003	139	4732	104	3202
28000	120	3813	160	6695	163	7003	137	4732	104	3275
32000	120	3907	157	6695	161	7003	135	4732	104	3361
36000	120	4015	154	6695	158	7003	133	4732	104	3463
40000	120	4141	151	6695	154	7003	130	4732	104	3584
44000	118	4217	146	6695	148	7003	127	4732	96	3573
47000	114	4276	141	6695	144	7003	123	4732	83	3494

TABLE 4-66

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	122	3711	156	5730	163	6299	143	4755	108	3256
28000	122	3825	155	5730	161	6299	141	4755	108	3336
32000	123	3947	152	5730	158	6299	139	4755	108	3430
36000	123	4076	148	5730	154	6299	136	4755	108	3539
40000	122	4206	143	5730	149	6299	132	4755	104	3586
44000	120	4347	138	5730	143	6299	127	4755	85	3440
47000	114	4346	133	5730	137	6299	122	4755	71	3529

TABLE 4-67

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	123	3692	150	4914	160	5584	147	4785	111	3316
28000	124	3850	147	4914	158	5584	145	4785	111	3405
32000	125	3981	144	4914	154	5584	142	4785	111	3506
36000	124	4084	140	4914	149	5584	138	4785	111	3630
40000	123	4249	135	4914	143	5584	133	4785	93	3418
44000	120	4417	128	4914	136	5584	126	4785	73	3454
47000	113	4436	123	4914	130	5584	120	4785	59	3750

TABLE 4-68

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	116	3431	158	6628	159	6712	138	4729	104	3053
28000	115	3499	157	6628	158	6712	136	4729	104	3125
32000	115	3581	154	6628	155	6712	135	4729	104	3211
36000	115	3677	151	6628	152	6712	132	4729	104	3315
40000	114	3790	147	6628	148	6712	129	4729	104	3440
44000	113	3939	142	6628	143	6712	126	4729	97	3439
47000	112	4101	138	6628	139	6712	122	4729	83	3347

TABLE 4-69

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	120	3495	161	6231	164	6536	143	4717	108	3103
28000	120	3584	159	6231	162	6536	141	4717	108	3181
32000	120	3666	156	6231	159	6536	138	4717	108	3274
36000	120	3805	152	6231	155	6536	136	4717	108	3383
40000	119	3909	147	6231	150	6536	132	4717	103	3418
44000	114	3981	141	6231	143	6536	127	4717	84	3277
47000	112	4150	135	6231	138	6536	122	4717	70	3369

TABLE 4-70

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	122	3491	156	5299	163	5860	147	4718	112	3164
28000	123	3609	153	5299	160	5860	145	4718	112	3249
32000	123	3737	150	5299	156	5860	142	4718	112	3348
36000	123	3863	145	5299	151	5860	138	4718	111	3458
40000	121	4001	139	5299	144	5860	133	4718	92	3240
44000	114	4048	132	5299	137	5860	126	4718	72	3496
47000	112	4259	126	5299	130	5860	119	4718	57	3614

TABLE 4-71

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	124	3492	149	4577	159	5199	152	4729	116	3234
28000	125	3655	146	4577	156	5199	149	4729	116	3327
32000	125	3749	142	4577	152	5199	144	4729	116	3435
36000	123	3886	137	4577	146	5199	139	4729	100	3246
40000	121	4069	130	4577	138	5199	132	4729	80	3179
44000	113	4140	122	4577	129	5199	124	4729	60	3492
47000	111	4353	107	4577	123	5199	110	4729	45	4187

TABLE 4-72

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	116	3209	158	6151	159	6240	142	4791	108	2961
28000	115	3282	156	6151	157	6240	140	4791	108	3040
32000	115	3372	153	6151	154	6240	138	4791	108	3137
36000	114	3479	148	6151	149	6240	135	4791	108	3253
40000	113	3618	143	6151	144	6240	131	4791	103	3297
44000	112	3830	138	6151	138	6240	126	4791	85	3140
47000	110	4006	133	6151	133	6240	121	4791	70	3226

TABLE 4-73

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	120	3277	160	5743	164	6078	147	4754	112	3017
28000	120	3372	157	5743	161	6078	144	4754	112	3102
32000	120	3484	153	5743	157	6078	141	4754	112	3203
36000	120	3616	148	5743	152	6078	138	4754	111	3296
40000	115	3664	142	5743	145	6078	132	4754	91	3082
44000	112	3880	134	5743	137	6078	125	4754	71	3146
47000	106	3941	128	5743	130	6078	118	4754	57	3489

TABLE 4-74

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	122	3286	154	4864	162	5448	152	4730	116	3085
28000	123	3409	151	4864	158	5448	149	4730	116	3176
32000	123	3535	146	4864	153	5448	144	4730	116	3288
36000	122	3669	140	4864	147	5448	139	4730	99	3068
40000	115	3725	133	4864	139	5448	132	4730	79	3025
44000	112	3985	125	4864	129	5448	123	4730	58	3369
47000	104	3968	113	4864	123	5448	111	4730	43	4217

TABLE 4-75

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	124	3307	147	4224	158	4807	156	4718	120	3163
28000	125	3434	143	4224	154	4807	152	4718	120	3263
32000	124	3546	139	4224	148	4807	147	4718	109	3101
36000	122	3733	132	4224	140	4807	134	4718	86	2950
40000	114	3792	124	4224	130	4807	130	4718	67	3123
44000	110	4059	106	4224	120	4807	118	4718	40	3913
47000	103	4101	117	4224	108	4807	108	4718	0	0

TABLE 4-76

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	115	3002	157	5697	158	5792	146	4848	112	2886
28000	115	3084	154	5697	155	5792	143	4848	114	2977
32000	114	3185	150	5697	151	5792	140	4848	112	3088
36000	114	3309	145	5697	146	5792	140	4848	111	3193
40000	112	3498	139	5697	140	5792	131	4848	91	2956
44000	108	3665	132	5697	132	5792	124	4848	71	3016
47000	102	3740	124	5697	126	5792	117	4848	57	3384

TABLE 4-77

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	120	3074	158	5301	163	5647	152	4835	110	2948
28000	120	3177	155	5301	159	5647	148	4835	116	3045
32000	120	3301	150	5301	154	5647	143	4835	116	3165
36000	116	3367	143	5301	147	5647	138	4835	98	2915
40000	112	3537	136	5301	139	5647	131	4835	78	2882
44000	105	3637	127	5301	130	5647	122	4835	57	3259
47000	102	3835	119	5301	123	5647	112	4835	42	4328

TABLE 4-78

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	123	3096	153	4509	161	5075	157	4794	121	3024
28000	123	3224	148	4509	156	5075	152	4794	121	3127
32000	122	3353	143	4509	150	5075	146	4794	107	2920
36000	117	3443	135	4509	141	5075	138	4794	86	2794
40000	112	3625	127	4509	131	5075	129	4794	65	2997
44000	103	3702	111	4509	122	5075	116	4794	44	3971
47000	102	3997	111	4509	110	5075	109	4794	0	0

TABLE 4-79

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - CH54B

TARHE

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
24000	125	3135	144	3868	156	4443	161	4761	125	3109
28000	125	3232	140	3868	151	4443	155	4761	117	3008
32000	123	3391	134	3868	143	4443	147	4761	95	2761
36000	116	3480	125	3868	133	4443	137	4761	74	2808
40000	111	3720	107	3868	124	4443	128	4761	52	3335
44000	103	3840	114	3868	108	4443	110	4761	0	0
47000	101	4193	88	3868	111	4443	110	4761	0	0

APPENDIX A

FUNCTIONS FOR CALCULATING BASIC FUEL FLOW

There are four functions that can be used to calculate the basic fuel flow for the CH-54B helicopter. In order to use the functions the following data is needed:

1. Flight Mode
2. Temperature
3. Pressure (altitude)
4. Gross weight

Which of the four functions will be used depends on the flight mode. The first function is for HIGE (Hover In Ground Effect).

$$FF\ (HIGE) = f\ (TEMP, ALT, GW)$$

The second function is for HOGE (Hover Out of Ground Effect).

$$FF\ (HOGE) = f\ (TEMP, ALT, GW)$$

The third function is for NOE (Nap of the Earth).

$$FF\ (NOE) = f\ (TEMP, ALT, GW)$$

The fourth function is for Forward Flight.

$$FF\ (Forward\ Flight) = f\ (AS, TEMP, ALT, GW)$$

The equation for FF (HIGE) is:

$$FF\ (HIGE) = A\ (ALT) + B\ (TEMP) + C\ (GW) + D\ (ALT)(TEMP) + E\ (ALT)\ (GW) + F\ (TEMP)\ (GW) + G\ (ALT)\ (TEMP)\ (GW) + K$$

Where ALT is the altitude, TEMP is the temperature and GW is the gross weight and the constants have the following values:

$A = -2.26577414 \times 10^{-1}$	$E = 6.53806939 \times 10^{-6}$
$B = -3.68092692$	$F = 2.501126 \times 10^{-4}$
$C = 6.31563254 \times 10^{-2}$	$G = 2.83197132 \times 10^{-8}$
$D = -7.00323049 \times 10^{-4}$	$K = 1.38898618 \times 10^{3}$

The equation for FF (HOGE) is exactly the same form as FF (HIGE). A new set of values for the constants is used. These values are:

$A = -2.85681199 \times 10^{-1}$ $E = 8.70788972 \times 10^{-6}$

$B = -6.36861926$ $F = 3.36683661 \times 10^{-4}$

$C = 7.23039433 \times 10^{-2}$ $G = 1.69979089 \times 10^{-8}$

$D = -2.77059811 \times 10^{-4}$ $K = 1.32853046 \times 10^{3}$

The equation for FF (NOE) is once again the same as FF (HIGE). The new values for the constants are:

$A = -2.25313237 \times 10^{-1}$ $E = 6.53093093 \times 10^{-6}$

$B = -1.81487763$ $F = 1.89563492 \times 10^{-4}$

$C = 6.19677491 \times 10^{-2}$ $G = 4.70156682 \times 10^{-8}$

$D = -1.25857387 \times 10^{-3}$ $K = 1.33876822 \times 10^{3}$

For the Forward Flight modes the form of the equation is:

$$FF = A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(GW) + F(ALT) + G(AS^3)(TEMP) + H(AS^2)(TEMP) + I(AS)(TEMP) + J(AS^3)(GW) + K(AS^2)(GW) + L(AS)(GW) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(GW) + Q(TEMP)(ALT) + R(GW)(ALT) + S(TEMP)(GW)(ALT) + T$$

Where AS is the air speed in kts and the values of the constants are:

$A = 4.77409225 \times 10$ $K = 2.95139712 \times 10^{-5}$

$B = -3.15820072 \times 10^{-1}$ $L = -3.21942568 \times 10^{-3}$

$C = 1.80530327 \times 10^{-3}$ $M = 8.82530813 \times 10^{-8}$

$D = 1.00143468$ $N = -1.91133277 \times 10^{-5}$

$E = 1.4945315 \times 10^{-1}$ $O = 2.55668536 \times 10^{-4}$

$F = -6.81144372 \times 10^{-2}$ $P = 1.49611784 \times 10^{-4}$

$G = 7.08703408 \times 10^{-6}$ $Q = -2.0221305 \times 10^{-6}$

$H = -1.71042809 \times 10^{-3}$ $R = 1.854757 \times 10^{-6}$

$I = 2.86432281 \times 10^{-2}$ $S = 2.7745998 \times 10^{-9}$

$J = -9.93970044 \times 10^{-8}$ $T = -5.06537903 \times 10^{2}$

These functions allow anyone with a simple calculator to figure the fuel flow of the aircraft and bypass both looking up the values and interpolating for points in between the data points in the tables.

The above equations calculate the basic fuel flow for the CH-54B helicopter with the following accuracies:

FF (HIGE) - 96.24%

FF (HOGE) - 96.25%

FF (NOE) - 96.24%

FF (Forward Flight) - 98.60%

APPENDIX B

FUNCTION FOR CALCULATING DELTA FUEL FLOW FOR DRAG

The function below will calculate the delta fuel flow for drag for the CH-54B helicopter. Recall from the discussion in chapter three that this value is added to the basic fuel flow value whenever drag is increasing the rate of fuel flow.*

In order to use the function the following data is needed:

1. Air Speed (AS)
2. Equivalent Square Footage of Drag (SQ)
3. Temperature (TEMP) in degrees centigrade
4. Altitude (ALT) in feet above sea level

That is:

$$FF\ (Drag) = f(AS, SQ, TEMP, ALT)$$

The equation for FF (Drag) is:

$$FF\ (Drag) = A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(SQ) + F(ALT)$$
$$+ G(AS^3)(TEMP) + H(AS^2)(TEMP) + I(AS)(TEMP) + J(AS^3)(SQ) + K(AS^2)(SQ)$$
$$+ L(AS)(SQ) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(SQ)$$
$$+ Q(TEMP)(ALT) + R(SQ)(ALT) + S(SQ)(ALT)(TEMP) + T$$

Where the constants have the following values:

$A = 3.21749353 \times 10$	$K = -5.58700168 \times 10^{-3}$
$B = -4.15377345 \times 10^{-1}$	$L = 3.58818054 \times 10^{-1}$
$C = 1.72593842 \times 10^{-3}$	$M = -1.85112036 \times 10^{-7}$
$D = -1.57573302$	$N = 3.85783619 \times 10^{-5}$
$E = -5.83611763$	$O = -2.80831754 \times 10^{-3}$
$F = 9.10231527 \times 10^{-2}$	$P = -4.35051257 \times 10^{-2}$
$G = -3.52395284 \times 10^{-6}$	$Q = 2.85686278 \times 10^{-5}$
$H = -1.40630294 \times 10^{-3}$	$R = -2.33476925 \times 10^{-4}$
$I = 1.99367046 \times 10^{-1}$	$S = 1.47662278 \times 10^{-6}$
$J = 3.18551206 \times 10^{-5}$	$T = -9.08662781 \times 10^{2}$

There is no delta fuel flow for drag for HIGE, HOGE or NOE flight.

This equation calculates the delta fuel flow for drag value with an accuracy of 99.24%. It should be noted that in some instances the computed value wiil be negative. If this occurs, zero (Ø) should be used as the value for delta fuel flow.

APPENDIX C

FUNCTION FOR CALCULATING GROUND IDLE FUEL FLOW

The function below will calculate the ground idle fuel flow rate for the CH-54B helicopter. In order to use the function the following data is needed:

1. Temperature (TEMP) in degrees centigrade.

2. Altitude (ALT) in feet above sea level.

That is:

$$FF\ (Idle) = f\ (TEMP, ALT)$$

The equation, for FF (Idle) is:

$$FF\ (Idle) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D(TEMP^2) + E(ALT^2) + F$$

Where the constants have the following values:

$A = 3.02940503$ $\qquad$ $D = 1.25000076 \times 10^{-3}$

$B = -6.52094567 \times 10^{-2}$ $\qquad$ $E = 1.14508859 \times 10^{-6}$

$C = -9.97143352 \times 10^{-5}$ $\qquad$ $F = 1.72575027 \times 10^{3}$

This equation calculates the ground idle fuel flow rate with an accuracy of 99.98%.

APPENDIX D

FUNCTIONS FOR CALCULATING GROSS WEIGHT LIMITS FOR TAKEOFF

The functions given below will calculate the gross weight limits for take off for the CH-54B helicopter. Each of the functions is of the same basic form with the values of the constants changing depending on which take off criteria is being used. In all cases the Structural Gross Weight Limit of the CH-54B helicopter is 47,000 lbs.

In order to use the functions the following data is needed:

1. Temperature (TEMP) in degrees centigrade

2. Altitude (ALT) in feet above sea level

That is:

$$GW\ (Limit) = f\ (TEMP, ALT)$$

The basic equation for GW (Limit) is:

$$GW\ (Limit) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D$$

For take off criteria #1 the equation must be used twice, once using the engine limit constants and once using the transmission limit constants. For take off criteria #1 the constants for engine limits are:

$A = -2.02885241 \times 10^{2}$ $\quad C = 5.03571529 \times 10^{-3}$

$B = -1.85557848$ $\quad D = 5.96987584 \times 10^{4}$

For take off criteria #1 the constants for transmission limits are:

$A = -7.42742901 \times 10$ $\quad C = 1.17835794 \times 10^{-3}$

$B = -7.21152484 \times 10^{-1}$ $\quad D = 5.19967998 \times 10^{4}$

For take off criteria #2 two checks must also be made. The constants for engine limits, take off criteria #2 are:

$A = -1.90865232 \times 10^{2}$ $\quad C = 4.65221412 \times 10^{-3}$

$B = -1.75265028$ $\quad D = 5.639723 \times 10^{4}$

For take off criteria #2 the constants for transmission limits are:

$A = -6.75385752 \times 10$ $\quad C = 6.32214971 \times 10^{-4}$

$B = -6.77228913 \times 10^{-1}$ $\quad D = 5.04134067 \times 10^{4}$

Also for take off criteria #3 two checks must be made. The constants for engine limits, take off criteria #3 are:

$A = -2.18250729 \times 10^{2}$ $\quad C = 5.44564507 \times 10^{-3}$

$B = -1.9960103$ $\quad D = 6.41927886 \times 10^{4}$

For take off criteria #3 the constants for transmission limits are:

$A = -8.4012619 \times 10$ $\quad C = 1.44485744 \times 10^{-3}$

$B = -8.10124241 \times 10^{-1}$ $\quad D = 5.6131479 \times 10^{4}$

This equation with the various sets of constants gives results that are 99.41% accurate or better.

APPENDIX E

SHORT DESCRIPTION OF TARHE (CH-54B) DATA SOUCE

DRDAV-EQA(A) SEP 18 1978

SUBJECT: Short Description of CH-54B Performance Data Provided to TRADOC Systems Analysis Activity (TRASANA)

MFR:

1. References:

a. Operator's Manual, Army Model CH-54B Helicopter, TM55-1520-217-10-2.

b. Limited Performance tests, CH-54B (TARHE) Helicopter, USAASTA Project 72-40.

c. Determination of the Effects of Rotor Blade Compressibility on the Performance of the UH-1F; FTC-TR-65-17.

d. CH-54B Flight Manual Data based on Flight Test Results, SER 64356.

2. The performance data presented to TRASANA is the result of combining the helicopter power required, engine power available and engine fuel flow characteristics. The CH-54B power required was calculated from a non-dimensional representation of engine power required (coefficient of power) v.s. gross weight (coefficient of thrust) and true airspeed (advance ratio). The non-dimensional power required was obtained from reference 1a and 1b. All performance in ground effect represents a 10 foot wheel height. A temperature dependent correction, based on the method outlined in reference 1c, was made to the power required to account for compressibility which could not be accounted for in the non-dimensional representation.

3. The T73-P-700 engine power available to the CH-54B (which was used in combination with the power required to find helicopter take-off and speed limits) was used as a function of altitude and temperature, from reference 1d.

4. The engine fuel flow at a particular altitude and temperature combination was derived from a representative referred fuel flow as a function of referred engine power. The referred fuel flow curve for the T73-P-700 engine was taken from reference 1d. The calculated fuel flows reflect 5% conservatism. A referred parameter is one which is divided by temperature and pressure ratios in order to represent all atmospheric conditions by one function.

5. The never exceed speeds (Vn.e.) were calculated from those shown graphically in reference 1d.

6. The Structural Gross Weight limit of the CH-54B is 47,000 lbs.

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